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on physiology, and Mrs. F. C. Torrance to be assistant in mathematics. Mr. Richard E. Dodge has been promoted to an associate professorship of natural science, and Miss E. B. Sebring to an associate professorship of the history of education.

MR. JAMES R. BAILEY, M. A., a graduate of the University of Texas, after a three years' course at the University of Munich, has just been appointed instructor in chemistry in his *alma mater*. He will be associated with Prof. Henry Winston Harper.

A POST-GRADUATE course of bacteriology has been established at the University of Sydney, N. S. W.

DR. H. MINKOWSKI, professor of mathematics in the University of Königsberg, has been called to the Zurich Polytechnic Institute. Dr. Graeff, of the University of Freiburg, i. Br., has been made assistant professor of mineralogy and petrography. Prof. Erismann has resigned the chair of hygiene at the University of Moscow.

#### DISCUSSION AND CORRESPONDENCE.

##### GEOLOGY IN THE COLLEGES AND UNIVERSITIES OF THE UNITED STATES.

UNDER this title\* Prof. T. C. Hopkins has collated some very interesting data concerning the teaching of geology in the United States, which, if properly analyzed, cannot fail to impress upon the reader the fact that in some branches, at least, our university instruction is not only defective, but largely in the hands of amateurs.

As is well known, geologic study and research are not only growing in favor, but are now recognized as essential in any institution offering instruction in pure science. Moreover, the practical application of geologic truth earns for geology a place in many of the technical schools. That so important a study should be so neglected by American universities and colleges is, indeed, surprising. In Mr. Hopkins'

\* 'Geology in the Colleges and Universities of the United States,' by T. C. Hopkins, being Chapter III. of the forthcoming Report of the Commissioner of Education, United States Bureau of Education, Washington, 1896.

paper 382 institutions are reported as teaching geology. By an examination of the tables furnished, corrected in a few instances by reference to the text, I find but 54 of that number offer instruction exceeding one year in length. Of the 54 thus selected four are not recognized in the body of the report as possessing any professional merit. Of the 50 now remaining 40 have established separate chairs, while 10 have geology combined with some other subject.

Another fact is interesting in this connection: The Geological Society of America, an association embracing, it is thought, not less than 90 per cent. of the trained geologists of this country, is represented in but 58 of the 382 institutions.\* In the 50 institutions of reputation, giving instructions exceeding one year, the Geological Society is represented in 39; in the 40 with separate departments it is represented in 34.

The conclusion to be drawn is now apparent, viz.: That the instruction offered in the majority of American universities and colleges is given by amateur geologists, who claim no recognition in the science they teach; offer no contributions; conduct no investigations; who are content to read with a class or hear a class recite. The true teacher must be able not only to read a text, but to interpret a text as well, and, what is of still greater importance, read nature and interpret her actions. A teacher inspires a student in precisely the degree in which he himself is inspired. If he be a 'text-book geologist,' it is reasonable to expect that his students will take their geology from books rather than from nature; if he be a 'working geologist,' that his students will seek the field, will frequent the laboratory.

The point I wish to make is this: Without a doubt the majority of institutions are teaching geology in an utterly inadequate manner, without proper facilities and by means of teachers unknown and unrecognized in the science. Some of these may be doing fairly good work; but the presumption is that the work will not, cannot, be of a high order.

But the mischief does not end here. Students from these institutions go forth with the

\* See list of Fellows, April 1896, *Bulletin of the Geological Society of America*, Vol. VII., p. 530, et seq.

idea that they have mastered geology; have they not recited so many weeks from a text-book? They have been misled. Education is more than a mere matter of the memory—a storing away of facts, as valuable as they may be; it is the cultivation of those powers by which the facts may be obtained at first hand. In this lies the training.

I am well aware of the excuse offered. Says the college president: "We do not pretend, nor do we care to make trained geologists; we wish to give our students an insight only into the science, that's all." Let me ask: How much chemistry worth the having can be obtained by reading or committing to memory the ordinary text-book? How much physics? How much biology? In a collegiate institution courses are offered in these branches for their *training* effect, without reference necessarily to the career of a student. Chemistry, physics and biology cannot, in these days, be taught without an equipment and teachers well versed in its management. Why should geology receive different treatment? Its demands are not less pressing and its educational value is fully as great. When the services of professionals can be obtained, why longer impose amateur instruction upon our students?

The root of the evil seems to lie not only in the want of a proper discrimination on the part of the patrons of educational institutions, but largely in the lack of a proper appreciation on the part of the authorities in charge. That more and louder protests have not been heard is strange. But the pace has been set. Those institutions which persist in offering cheap instruction, solely because it is cheap, must fall to the rear. That the best instruction will be given by the best trained teacher is axiomatic. Better by far that geology be not attempted than that it should be poorly presented; better that a curriculum be curtailed than that a study should be a source of weakness.

FREDERIC W. SIMONDS.

SCHOOL OF GEOLOGY,  
UNIVERSITY OF TEXAS, August, 1896.

ON A SUPPOSED IMMEDIATE EFFECT OF POLLEN.

TO THE EDITOR OF SCIENCE: I have been greatly interested in the account of a curious

freak in an apple tree given by Mr. T. H. Lennox in your issue of September 4, 1896, p. 317. After describing the freak, Mr. Lennox concludes that "there can be no reasonable doubt that the phenomenon arose from cross fertilization between pollen of the Talman Sweet and the ovule of the Greening." As some of the features of the case, as described by Mr. Lennox, seem to me opposed to such a conclusion, I venture the following suggestions:—

The apples on the northeast side of the tree, we are told, "were Rhode Island Greenings, such as the tree had always borne, while those on the southwest half of the tree were of a mixed character, *each apple being partly Greening and partly Talman Sweet.*" If the phenomenon is to be attributed to the direct action of the Talman Sweet pollen, it is difficult to understand why every apple on one half of the tree should be affected and none on the other half of the tree. As the pollen is normally carried by insects we should possibly expect a greater number of the fruits to be affected on the side toward the Talman Sweet tree than on the opposite side, but we should reasonably expect a portion of them to remain unaffected. We should also reasonably expect a few fruits on the opposite side of the tree to be similarly affected, as some of them would as surely be crossed with the Talman Sweet pollen as those on the side nearest the Talman Sweet tree. In other words, if this freak were due to cross pollination by insects with pollen of Talman Sweet, we should expect the fruits affected to be scattered irregularly over the tree, the majority being on the side adjoining the Talman Sweet tree. That the fruits on certain limbs or a certain part of the tree only should be affected and all of these similarly affected, is indeed difficult to explain as a result of cross pollination. One must necessarily presuppose a peculiar condition of this portion of the tree rendering possible the effect of the pollen described, as the other portion of the tree remains entirely unaffected. This is evidently Prof. Bailey's conclusion, as in his note following the article by Mr. Lennox he says: "Like heredity of mutilations it (the immediate effect of pollen) is rare and therefore apparently exceptional." Even when we assume some pecu-